N Market St
0541-101
n/a

# SITE ASSESSMENT REPORT
Tosco Corporation - Spokane Terminal
Spokane, Washington
T10-8810-013

Site Name/Address:

Tosco Corporation - Spokane Terminal
East 3225 Lincoln Road
Spokane, Washington 99207

Investigation Participants:

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Dates of Site Assessment:

January 10 through 13, 1989

## 1.0 INTRODUCTION

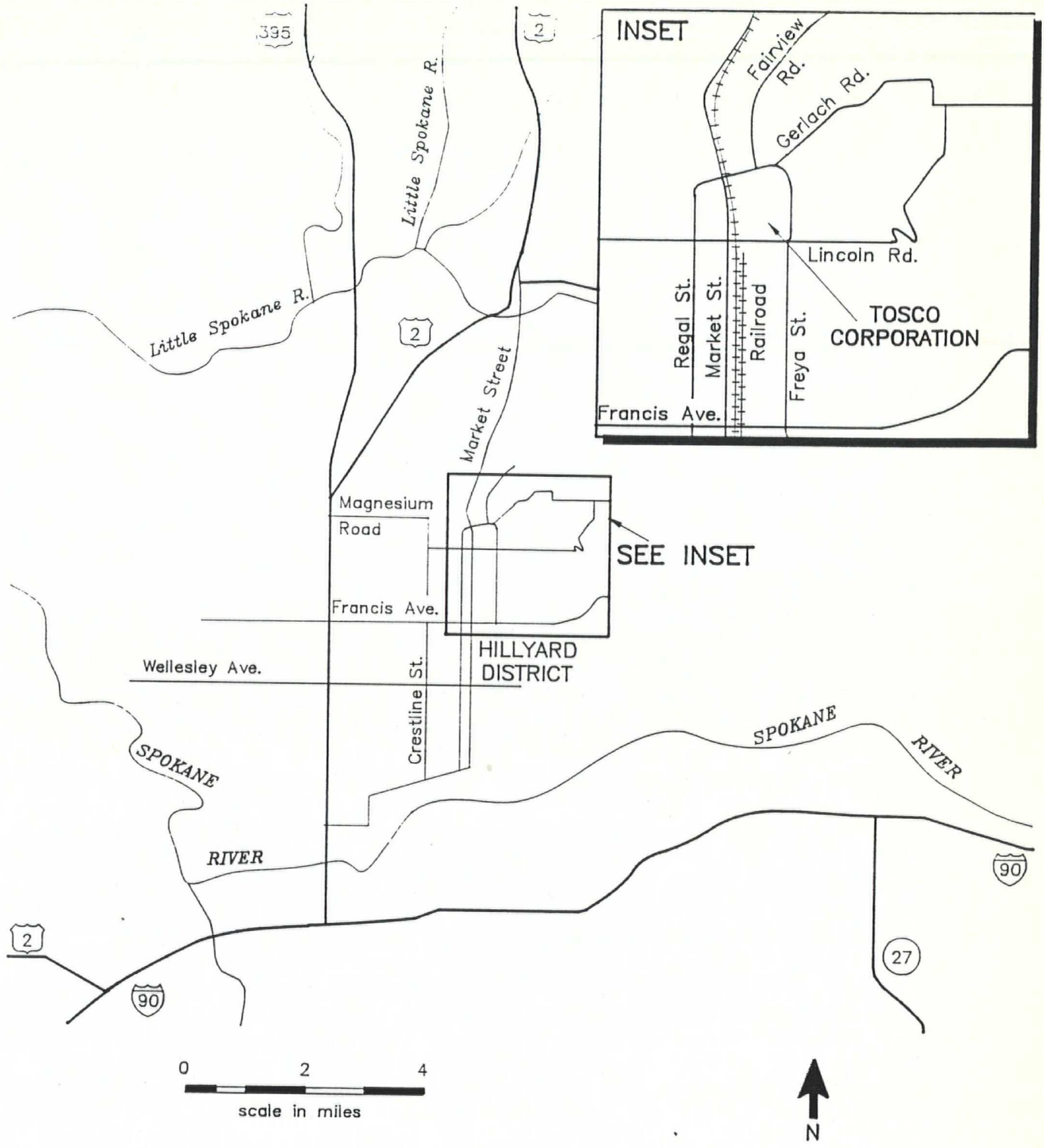
Ecology and Environment, Inc., (E & E), the designated Technical Assistant Team (TAT) contractor to the U.S. Environmental Protection Agency (EPA), was directed by the EPA Region X Superfund Response and Investigations Section (SRIS) to conduct a site assessment at the Tosco Corporation - Spokane Terminal (Tosco) (Figure 1). The terminal facility has been included on a list of potentially responsible parties (PRPs) within an area referred to as the "North Market Street Site" as defined by the Washington State Department of Ecology (Ecology) (Golder, 1985). The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Hazardous Substance List (HSL) of organic analytes identified as contaminants impacting soil and groundwater at Tosco include both volatile and base/neutral/acid extractable (BNA) compounds typical of the chemical components of petroleum.

The Tosco property has been under investigation by the EPA since at least 1980, at which time the EPA Surveillance Branch conducted an inspection with the assistance of Ecology (EPA 1980). Conclusions reached following the inspection recognized the pollution potential of an abandoned waste lagoon area and addressed the need for remedial measures. In 1981, Tosco Corporation contracted Earth Sciences Associates, Inc., to conduct a preliminary hydrogeological investigation and determine the potential for groundwater contamination by the refinery lagoons. The study concluded that the potential did exist for contamination to the underlying Spokane Valley - Rathdrum Prairie Aquifer. The report also stated that distinguishing which lagoons were contributing specific wastes would be difficult since the waste ponds on both the current Tosco acreage and the adjacent Draper Tractor property contained wastes generated by similar refinery operations.

In 1985, Ecology contracted Golder Associates (Golder) to conduct an extensive, multi-phased remedial investigation (RI) of a three mile radius area, extending from the intersection of North Market Street and Freya/Regal streets. Phase I resulted in a final report outlining demographics, property ownership and histories, drinking water supplies, and potential health impacts. Phase II marked the initiation of actual field activities and included sampling from selected private wells within the 3 mile radius, ground penetrating radar geophysical surveying and shallow pit sampling using backhoe equipment.

Phase III was a continuation of Phase II and included additional groundwater and soil sampling. Vertical contaminant migration was investigated by drilling soil borings and installing six monitoring wells. Phase III was discontinued in May 1987. Neither Phase II or III resulted in a final report to Ecology. The Phase II and III deliverable to Ecology was limited to data summary tables, maps, logs and graphics in March 1988 due to Ecology budgetary limitations.

In May 1987, Ecology announced a proposed CERCLA Hazard Ranking System (HRS) score of 32.61 to the Tosco property, based on the available RI data. In November 1987 Ecology conducted a groundwater sampling of the six monitoring wells installed during the RI (Figure 2).





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|---|---|
| Job: T10-8810-013 | Waste Site: TWA0256 |
| Drawn by: D. P. | Date: March 8, 1989 |

FIGURE 1
LOCATION MAP
TOSCO CORP.-SPOKANE TERMINAL
Spokane, WA

The analytical results documented both volatile and BNA HSL organic compounds in groundwater directly down gradient of the Tosco property. In particular well NM-4, located immediately west and down gradient of abandoned waste pond acreage on Tosco property, was severely contaminated by "several inches" of floating hydrocarbons (Ewy 1989). No action was taken at that time to capture the product.

## 2.0 OWNER/OPERATOR

The Tosco facility has operated as an oil products storage and loading terminal since April 1976 when the property was purchased by Tosco Corporation from Petroleum Terminal Company, a subsidiary of Phillips Petroleum (Golder 1985).

## 3.0 LOCATION

Tosco is located in sec. 22, T. 26, N., R. 43 E. (USGS 1973). The property is in Spokane county, approximately 1.5 miles north of the City of Spokane corporate limit in an area referred to a Hillyard (see Figure 1).

## 4.0 SITE DESCRIPTION AND SURROUNDING AREA

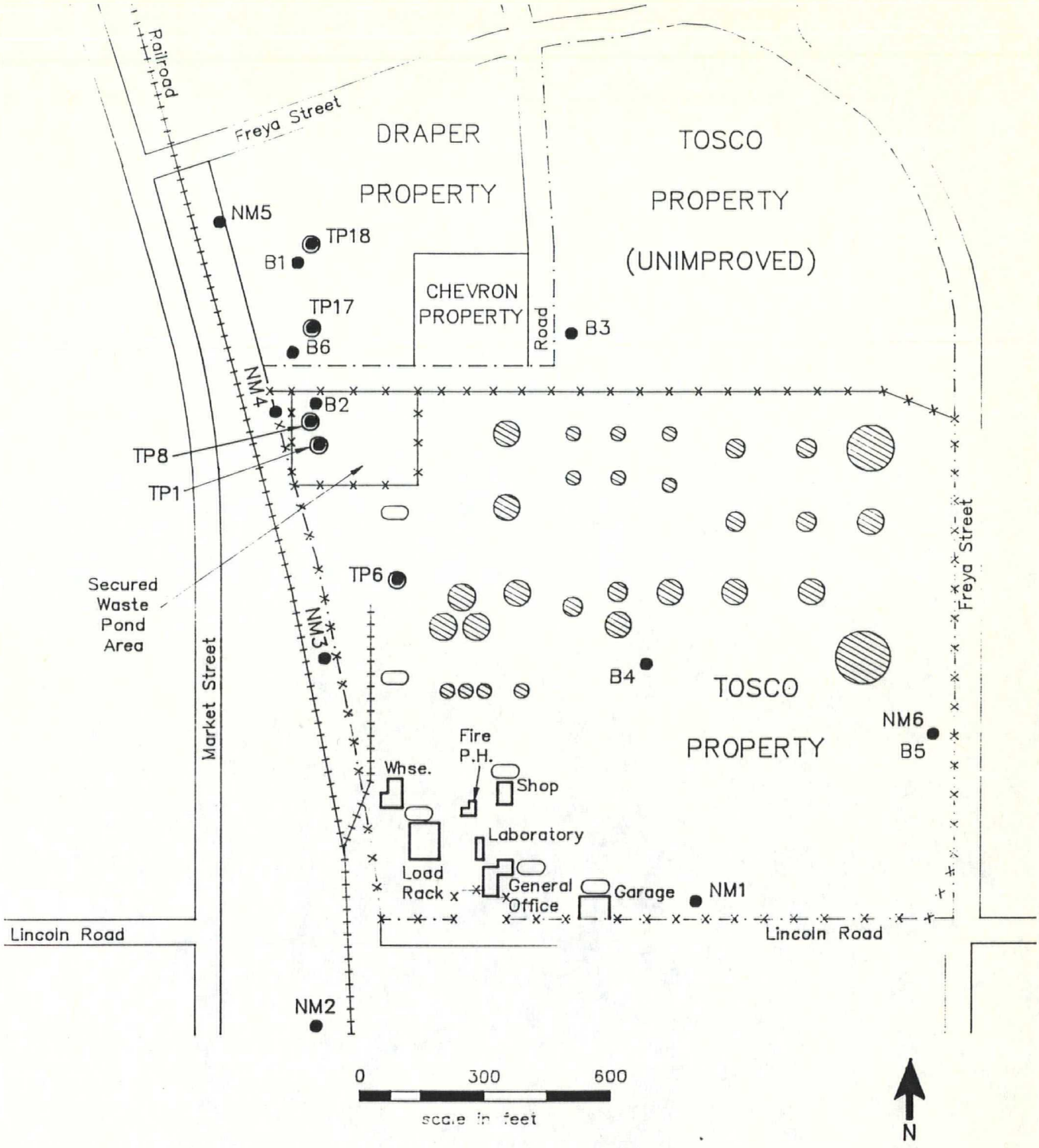
The Tosco property covers an area of at least 50-acres in an industrial land use district as defined by the county planning department (Golder 1985). The property is bordered to the south by Lincoln Road; to the east by Freya Street; to the west by Burlington Northern owned railroad tracks paralleling North Market Street; and to the north by Freya Street and properties owned by Draper Tractor Parts, Inc., and Chevron Corporation (Figure 2). The Tosco property is surrounded and secured by fencing.

## 5.0 TOPOGRAPHY AND DRAINAGE

The topography of the developed portion of the site is graded flat, having a gentle slope toward the northwest. The northeast corner of the property is undeveloped and is bisected by an intermittent stream drainage which originates from the highlands that rise immediately east of the facility. The flat relief of the developed property has been broken by the construction of spill prevention containment dikes surrounding the petroleum product tanks which cover the entire east-central portion of the property (Figure 2).

## 6.0 GEOLOGY/HYDROGEOLOGY

Sediments underlying the site are composed of unconsolidated, glacially derived Quaternary fluvial, lacustrine and Missoula Flood deposits typical of the Spokane Valley. In the Hillyard area these deposits are estimated to reach a maximum thickness in excess of 700 feet. The highlands rising immediately east of the site are composed of rocks of the Tertiary age Columbia River Group.




LEGEND

- Fence
- Tosco property line
- Storage tank
- NM# Monitoring well
- B# Boring
- Approx. location of former underground tank
- TP# Test pit in waste pond area which exhibited oily soil

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FIGURE 2
SITE MAP
TOSCO CORP.-SPOKANE TERMINAL
Spokane, WA

Drilling logs prepared during the North Market Street Site RI reported the local stratigraphy as composed principally of a dense grey, fine to course sands, containing occasional silt, and fine to medium gravel. Interbedded with the sands were discontinuous layers of both silt and gravel. Scattered cobble zones were also reported. The deepest RI borehole reached 178 feet below ground surface (b.g.s.) and was completed as monitoring well NM-2.

The water table aquifer which extends accross the entire Spokane Valley is referred to as the Spokane Valley - Rathdrum Prairie Aquifer. The depth below ground surface to the water table in the North Market Street Site area is approximately 150 to 160 feet b.g.s., with a flow direction generally to the west-northwest. The thickness of the aquifer beneath the site is not precisely defined, though a well drilled in 1949 by Phillips Refining Company logged sands down to a depth of 210 feet b.g.s. which were underlain by blue clay from 210 to 216 feet b.g.s. (Earth Sciences 1981). An estimated transmissivity value for the aquifer in the vicinity of the site has been reported at $0.40 \times 10^6$ $ft^2$/day, assuming a saturated thickness of 160 feet (Golder 1985).

## 7.0 WATER USE

The Spokane Valley - Rathdrum Prairie Aquifer is an EPA designated sole source aquifer for the Spokane area (Golder 1985). The entire aquifer is estimated to supply water to approximately 340,000 people for domestic use (Golder 1985). In support of the designation, the Spokane County Planning Department established an Aquifer Sensitive Overlay zone to manage impact on the aquifer. Tosco is located within this overlay zone (Golder 1985).

## 8.0 OVERVIEW OF SITE OPERATIONS

### 8.1 Historical

From 1938 to 1948 the Tosco property, and property immediately to the north, was owned by Inland Empire Refineries, Inc., and was the site of an oil refinery and tank farm operation (Golder 1985). In 1948 the facility was purchased by Wasatch Oil Company and continued operations as a refinery, producing an estimated 7,500-barrels per day of various oil products (Golder 1985). Photographs from the period reportedly show the existence of open waste and trash disposal areas. Wasatch sold the facility to Phillips Petroleum Company in 1949. Phillips operated the refinery until 1953 when the facility was transferred to a subsidiary of Phillips called Petroleum Terminal Company. Petroleum Terminal Company decommissioned the refinery in 1953, but continued to operate the tank farm. In 1976 the tank farm was sold to Tosco Corporation.

During the refinery operation years, refinery related wastes were disposed of in a cluster of unlined waste ponds located near the northwest corner of the current Tosco property, and extending north onto property now owned by Draper Tractor Parts, Inc. Historical photographs and geophysical survey data generated during the RI outline an area, potentially covering as much as 4-acres, and the existence of at least seven separate ponds (Golder 1985).

8.2 Current

The current Tosco property covers an area of over 50-acres and operates as an oil products storage and loading terminal. Recent and ongoing operations at the Spokane Terminal under Tosco ownership will be discussed in Section 9.0.

## 9.0 TOSCO OPERATIONS INQUIRY

On January 20, 1989, an EPA letter of inquiry was mailed to Tosco Corporation in an effort to establish a fuller understanding of the Spokane Terminal operations. The letter, which is attached as Appendix A, requested explanations and descriptions of various aspects of the facility including: tank capacities, pipelines, spills, leaks and wastes generated. Historical information on tanks, pipelines and discharge systems that existed under previous ownership was also requested. Written response to the inquiry was received by EPA on February 16 and is also included in Appendix A.

In summary, Tosco reported that their ownership began on April 1, 1976 and that the facility currently utilizes 30 above ground storage tanks installed from 1939 to 1952. The tanks have a cumulative capacity of 391,500 barrels. The facility's output was estimated at 332,448 barrels/month. Products presently handled included:

regular leaded gasoline,
premium unleaded gasoline,
diesel oil,
stove oil,
jet A50 fuel,
transmix, and
ethanol.

The largest volumes handled were the diesel oil, followed by the gasolines.

Tosco stated that their historical records reported only one significant spill during ownership. The spill occurred in October 1979 and involved jet fuel, with an estimated 329 barrels recovered and 380 barrels lost into the ground and atmosphere. Two other spills involving a pit hole in tank No. 105 and a leaking 6-inch pipeline were detected and repaired in 1979 and 1980, respectively. No records of the quantities of product lost were available, but the volumes were assumed to be small. A total of six underground storage tanks having a cumulative capacity of 10,600 gallons have been identified on the property. These tanks have all been pulled. The approximate original positions of the removed tanks are shown in Figure 2.

## 10.0 E & E ASSESSMENT

The objectives of the TAT field activities were to conduct groundwater sampling and obtain additional facility background information for characterizing groundwater contamination, public health threat, and environmental threat associated with the decommissioned

refinery and current Tosco facility. The assessment involved the purging and sampling of the six North Market Street Site monitoring wells; two located on Tosco property and the remaining four on property located along the railroad grade owned by Glacier Parks Corporation, a subsidiary of Burlington Northern Railroad (Figure 2). The sampling was conducted to investigate the presence of floating non-aqueous liquid phases, and other organic pollutants impacting the aquifer.

## 11.0 SAMPLING PROGRAM

All sampling work was conducted in accordance with E & E TAT standard operating procedures and quality assurance (QA) protocols as defined in the project plan developed for the Tosco site assessment (E & E 1989). At each of the six monitoring wells (NM-1 through 6), except NM-4, groundwater was purged and sampled using a non-dedicated, portable, piston-driven Bennett sampling pump. Monitoring well NM-4 was purged and sampled using a teflon hand bailer, since the well was visibly contaminated by organics and the samplers did not want to risk unmanageable contamination of the Bennett pump system.

The initial sampling work plan called for sampling of the floating hydrocarbons in NM-4 previously documented by Ecology. No measurable thickness of floating product was identified during the TAT assessment, though traces of oil were observed in the water during purging. Thus, the decision was made in the field to collect a groundwater sample at NM-4.

For each well a minimum of three well volumes was purged prior to sampling. Groundwater measurement data sheets used to determine purge volumes in the field are found in Appendix B. Static water level measurements, along with previous measurements conducted in July 1987, are presented in Table 1. PH, conductivity and temperature were measured in the field at the time of sampling and are recorded on the groundwater measurement data sheets in Appendix B.

In addition to to the six groundwater samples submitted for laboratory analyses, five samples were also collected and analyzed for QA purposes. The QA samples included a transport (trip) blank, a blind duplicate, and three transfer blanks collected by pumping purified carbon-free water through the Bennett Sampling Pump system to assure that no cross contamination was occurring between sampling stations.

During the field sampling effort, Hart-Crowser, Inc., under contract to Tosco, was on site to observe activities and to collect selected split samples for parallel analyses.

## 12.0 RESULTS AND DISCUSSION

### 12.1 Analytical Results

Samples were collected, handled and analyzed, and results were reported per the TAT Sampling Plan/Quality Assurance Project Plan (E & E 1989). A quality assurance review of the analytical results

**TABLE 1**

GROUNDWATER MEASUREMENTS
Tosco Corporation - Spokane Terminal

| Well Number | Top of Casing Elevation* | Depth to Static Water Level | | Static Water Level Elevations* | |
|---|---|---|---|---|---|
| | | July 1987 | January 1989 | July 1987 | January 1989 |
| NM 1 | 2000.72 | 161.10 | 161.75 | 1839.62 | 1838.97 |
| NN 2 | 1995.15 | 156.25 | 158.96 | 1838.90 | 1836.19 |
| NM 3 | 1990.54 | 157.35 | 158.65 | 1833.19 | 1831.89 |
| NM 4 | 1984.51 | 152.82 | 153.91 | 1831.69 | 1830.60 |
| NM 5 | 1983.72 | 153.50 | 154.64 | 1830.22 | 1829.08 |
| NM 6 | 1998.01 | 155.55 | 157.96 | 1842.46 | 1840.05 |

* All measurements are measured in feet relative to the top of surface steel casing monument. Elevations are measured relative to mean-sea-level as reported by Golder Associates, October 1985.

performed by E & E TAT chemists is presented in Appendix C along with the associated laboratory summary sheets. In general, the data were judged to be acceptable, except where flagged with qualifiers which modified the usefulness of the individual value.

In total, eleven water samples (T8120020-T8120032) were submitted for analyses to Columbia Analytical Services, Inc. in Longview, Washington. The sampling included groundwater samples from the six monitoring wells (NM-1 through 6), one blind duplicate, one transport blank and three transfer blanks. Each sample was analyzed for HSL volatile organics (EPA method 624) and BNA organics (EPA Method 625), as well as total organic carbon (TOC) and total organic halogen (TOX) analyses (EPA Method 415.1 (modified) and 9020). In addition, a groundwater sample collected from monitoring well NM-4 was analyzed for polychlorinated biphenyls (PCBs) (EPA Method 8080).

12.1.1 Volatiles, BNAs and PCBs

HSL analytes were detected in only one of the six wells sampled, that being monitoring well NM-4 (sample No. T8120023). Five volatile organic compounds were detected in the sample (Table 2). Concentrations ranged from 3.5 ug/l to 82 ug/l, with the highest concentration (82 ug/l) being total xylenes. The chlorinated compound, 1,2-dichloroethane, was one of the volatile organics detected, at a concentration of 3.5 ug/l. 1,2-Dichloroethane has a variety of uses, including an additive as a lead scavenger in anti-knock gasolines (Hawley 1981). Laboratory detection limits for the volatile analysis ranged from 1 ug/l to 10 ug/l and are listed on the analytical summary sheets found in Appendix C.

Semi-volatile BNA HSL analytes detected in monitoring well NM-4 were naphthalene, 2-methylnaphthalene, fluorene and phenanthrene. 2-Methylnaphthalene was reported in the highest concentration at 17 ug/l (Table 2). Laboratory method detection limits for the BNA analyses ranged between 5 ug/l and 50 ug/l, but were typically 5 ug/l.

PCBs were analyzed for in a groundwater sample collected from NM-4. None of the Arclors were recovered within the 0.1 ug/l detection limit (Table 2).

12.1.2 TOC and TOX

Total organic carbon and total organic halogens were analyzed in an effort to detect the presence of additional hydrocarbons or halogenated hydrocarbons not identified by the EPA analytical methods for HSL compounds. The organic carbon or organic halogen contributions by HSL volatile and semi-volatile organic contaminants can be reduced to equivalant TOC or TOX concentrations as a technique to estimate the presence of organic compounds not targeted under the HSL.

The TOC contribution by the HSL analytes detected at monitoring well NM-4 (T8120023) was calculated at 0.161 mg/l, while the TOC lab analysis reported 7.5 mg/l. The HSL TOC contribution at monitoring well NM-2 (T8120028) was zero, while the actual TOC was reported at 68 mg/l.

**TABLE 2**

MONITORING WELL GROUNDWATER SAMPLING SUMMARY
LIST OF ANALYTES DETECTED
Tosco Corporation - Spokane Terminal
Spokane, Washington
(units in ug/l, unless otherwise stated)

| | Ecology Nov. 1987 Sampling | | | EPA Jan. 1989 Sampling | |
|---|---|---|---|---|---|
| Parameter Detected | NM-1 | NM-2 | NM-4 | NM-2 | NM-4 |
| HSL Volatile Compounds: | | | | | |
| Benzene | 0.8 U | 20 | 43 | 1 U | 19 |
| 1,2-Dichloroethane | 1.8 U | 1.8 U | 1.8 U | 1 U | 3.5 |
| Ethylbenzene | 1.5 U | 1.5 U | 14 | 1 U | 7.1 |
| Toluene | 1.7 | 1.5 | 42 | 1 U | 19 |
| Xylenes, Total | 1.3 U | 1.3 U | 420 | 1 U | 82 |
| HSL Base/Neutral Acid Compounds: | | | | | |
| Acenaphthene | 1.1 U | 1.1 U | 110 | 5 U | 5 U |
| Anthracene | 0.9 U | 0.9 U | 17 | 5 U | 5 U |
| Benzo(a)Anthracene | 2.5 U | 2.5 U | 9 J | 5 U | 5 U |
| Dibenz(a,h)Anthracene | 2.0 U | 2.0 U | 11 | 5 U | 5 U |
| Chrysene | 0.6 U | 0.6 U | 12 | 5 U | 5 U |
| Fluoranthene | 3.5 U | 3.5 U | 32 | 5 U | 5 U |
| Benzo(b)Fluoranthene | 1.0 U | 1.0 U | 11 | 5 U | 5 U |
| Benzo(k)Fluoranthene | 4.2 U | 4.2 U | 11 J | 5 U | 5 U |
| Fluorene | 1.2 U | 1.2 U | 250 | 5 U | 6.1 |
| Naphthalene | 3.2 U | 3.2 U | 450 | 5 U | 15 |
| 2-Methylnaphthalene | 1.7 U | 1.7 U | 1400 | 5 U | 17 |
| Dibenzo(g,h,i)Perylene | 1.8 U | 1.8 U | 17 | 5 U | 5 U |
| Phenanthrene | 1.7 U | 1.7 U | 370 | 5 U | 8.3 |
| Pyrene | 3.2 U | 3.2 U | 31 | 5 U | 5 U |
| Benzo(a)Pyrene | 0.4 U | 0.4 U | 14 | 5 U | 5 U |
| Indeno(1,2,3-cd)Pryene | 1.7 U | 1.7 U | 18 | 5 U | 5 U |
| Polychlorinated Biphenyls: | | | | | |
| Total | NA | NA | NA | NA | 0.1 U |
| Indicator Parameters: | | | | | |
| TOX | NA | NA | NA | 68 mg/l | 7.5 mg/l |
| TOC | NA | NA | NA | 17 mg/l | 17 mg/l |

QUALIFIERS:

J - The associated numerical value is an estimated quantity because the reported concentrations were less than the laboratory detection limits, or quality control criteria were not met.

U - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit.

NA - Analyte not analyzed for during analysis.

Background organic carbon is typically present at 1 mg/l, or less, in groundwater (EPA 1985). The Spokane Valley - Rathdrum Prairie Aquifer is composed of coarse textured sediments of low organic carbon content and would be expected to exhibit typical (1 mg/l) background concentrations. Four of the six monitoring wells, including up-gradient well NM-6, reported TOCs less than the method detection limit of 5 mg/l, confirming the anticipated low background organic carbon concentrations.

The TOX analysis indicated detectable TOX concentrations in two of the six monitoring wells. For well NM-4, the organic halogen contribution by 1,2-dichloroethane was calculated to be 1.7 ug/l, while the laboratory analysis reported an estimated TOX concentration of 17 ug/l. Likewise, sample T8120028 from well NM-2, from which no HSL substances were detected, was reported to exhibit a TOX of 17 ug/l. For background comparison, up gradient well NM-6 had no detectable TOX.

12.2 Site Hydrogeology

A groundwater water table gradient map determined from measurements taken during the TAT assessment (Table 1) is presented in Figure 3. The direction of flow was primarily toward the northwest at the time of measurement. The gradient across the site, based upon the January 1989 measurements, averaged 0.006 ft/ft, but appeared to flatten near the northwestern corner of the site in the area of the NM-4.

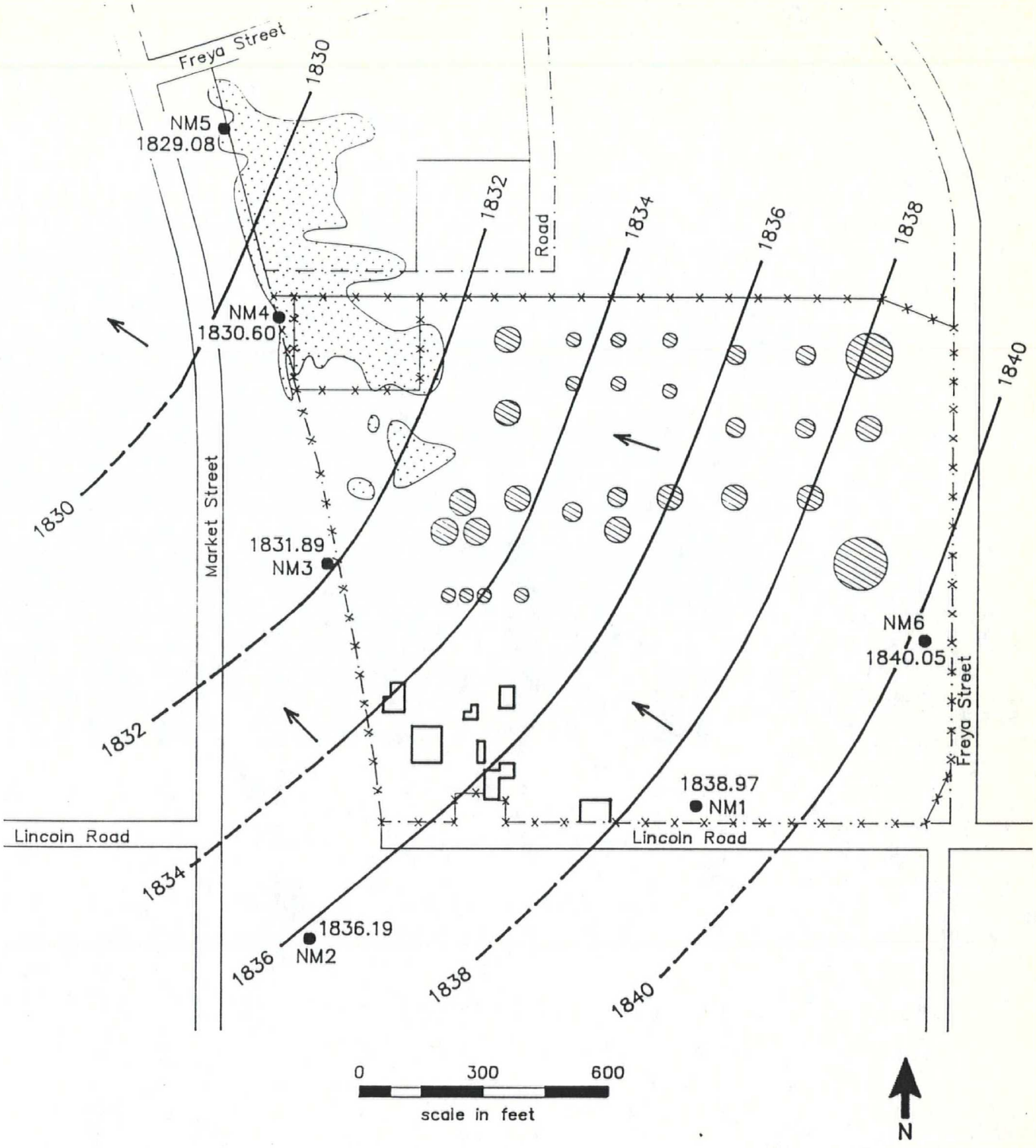
An average local velocity beneath the site can be estimated at 24 ft/day, assuming the following parameters:

- A local saturated sand aquifer thickness of 55 feet. The value is derived by assuming a depth to groundwater of 155 feet b.g.s. and a sand unit thickness of 210 feet as observed in the Phillips Refining Company drillers log (Earth Sciences, 1981);
- An assumed local sand hydraulic conductivity of $1.0 \times 10^3$ ft/day;
- A measured water table gradient of 0.006; and,
- An estimated sand porosity of 0.25.

The established gradient confirms that the location of well NM-4 is directly downgradient of the abandoned waste pond area. The similar west-northwest direction of flow on the adjacent Draper tractor property shows that well NM-5 appears not to be positioned directly down gradient of the most significant surface soil contamination identified within the secured, abandoned waste pond area on Tosco property.

**13.0 SUMMARY**

The E & E groundwater monitoring well sampling work conducted in January 1989, confirmed the existence of the chemical components typical of petroleum in water collected from well NM-4. This well is located




LEGEND

- Waste pond area geophysical anomalies as identified by Golder Associates
- Fence
- Property line
- —1840— Water table potentiometric contour line (feet above mean-sea level)
- Groundwater flow
- Storage tank
- Monitoring well

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FIGURE 3
GROUNDWATER GRADIENT MAP
JANUARY 1989
TOSCO CORP.-SPOKANE TERMINAL
Spokane, WA

approximately 100 feet directly down gradient of the abandoned refinery waste pond area. The background wells located up gradient to the waste pond area showed no indication of contamination. Groundwater collected from monitoring well NM-2 contained non-specific organic and halogenated organic contaminants detected by the TOC and TOX analyses. The presence of these contaminants are interpreted to have originated from undefined off-site sources, and are not considered to be contributing to the organic compounds detected in NM-4, based on local groundwater gradient conditions.